

What Is Claimed Is:

1. Apparatus for effecting a desired geometric
change in the annulus of a heart valve, said apparatus
5 comprising:

a plication band comprising:

first and second legs each having a first
end, said first ends of said first and second legs
having a tissue piercing configuration; and

10 a bridge having first and second ends, said
first end of said bridge being connected to said first
leg and said second end of said bridge being connected
to said second leg such that said first ends of said
first and second legs are separated by a first given
15 distance;

said bridge being configured such that when
said first ends of said first and second legs have
pierced tissue at said first given distance, said
bridge may be deformed so as to cause said first ends
20 of said first and second legs to move toward one
another so as to thereafter be separated by a second,

shorter given distance, whereby said first and second legs gather together the pierced tissue to effect a desired geometric change in the annulus of the heart valve.

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2. Apparatus according to claim 1 wherein said bridge may be deformed so as to cause said first ends to point in opposition to one another.

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3. Apparatus according to claim 1 wherein said bridge further comprises a through-hole for receiving a linking construct whereby said plication band may be linked to an adjacent plication band.

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4. Apparatus according to claim 3 wherein said bridge is crimpable so as to capture said linking construct within said through-hole.

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5. Apparatus according to claim 3 wherein said through-hole has a circular configuration so as to receive a round filament.

6. A plication band according to claim 3 wherein said through-hole has a elongated configuration so as to receive a flat strap.

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7. Apparatus for effecting a desired geometric change the annulus of a heart valve, said apparatus comprising:

10 first and second plication bands, each said plication band comprising:

first and second legs each having a first end, said first ends of said first and second legs having a tissue piercing configuration; and

15 a bridge having first and second ends, said first end of said bridge being connected to said first leg and said second end of said bridge being connected to said second leg such that said first ends of said first and second legs are separated by a first given distance;

20 said bridge being configured such that when

said first ends of said first and second legs have
pierced tissue at said first given distance, said
bridge may be deformed so as to cause said first ends
of said first and second legs to move toward one
5 another so as to thereafter be separated by a second,
shorter given distance, whereby said first and second
legs gather together the pierced tissue to effect a
desired geometric change in the annulus of the heart
valve; and

10 a linking construct connected to said first and
second plication bands.

8. Apparatus according to claim 7 wherein the
bridge of each plication band may be deformed so as to
15 cause said first ends of that plication band to point
in opposition to one another.

9. Apparatus according to claim 7 wherein the
bridge of each plication band further comprises a
20 through-hole for receiving said linking construct.

10. Apparatus according to claim 9 wherein the bridge of each plication band is crimpable so as to capture said linking construct within said through-hole.

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11. Apparatus according to claim 9 wherein said linking construct comprises a round filament, and further wherein said through-holes have a circular configuration so as to receive said round filament.

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12. Apparatus according to claim 9 wherein said linking construct comprises a flat strap, and further wherein said through-holes have an elongated configuration so as to receive said flat strap.

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13. Apparatus according to claim 7 wherein said linking construct comprises a resilient material.

14. Apparatus according to claim 7 wherein said linking construct comprises a formable material such

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that said formable material can be set into a desired shape.

15. Apparatus according to claim 7 wherein said
5 linking construct is permanently connected to said
first and second plication bands.

16. Apparatus according to claim 7 wherein said
linking construct comprises a linear linkage extending
10 between said first and second plication bands.

17. Apparatus according to claim 7 wherein said
linking construct comprises a linkage strip extending
between said first and second plication bands.

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18. Apparatus according to claim 7 wherein said
linking construct comprises a linkage rod extending
between said first and second plication bands.

19. A method for reducing the circumference of the annulus of a heart valve, said method comprising the steps of:

providing apparatus for effecting a desired
5 geometric change in the annulus of a heart valve, said apparatus comprising:

a plication band comprising:

first and second legs each having a
first end, said first ends of said first and second
10 legs having a tissue piercing configuration; and

a bridge having first and second ends,
said first end of said bridge being connected to said
first leg and said second end of said bridge being
connected to said second leg such that said first ends
15 of said first and second legs are separated by a first
given distance;

said bridge being configured such that
when said first ends of said first and second legs
have pierced tissue at said first given distance, said
20 bridge may be deformed so as to cause said first ends
of said first and second legs to move toward one

another so as to thereafter be separated by a second,
shorter given distance, whereby said first and second
legs gather together the pierced tissue to effect a
desired geometric change in the annulus of the heart
5 valve; and

deploying the plication band into the annulus of
the heart valve so as to reduce the circumference of
the heart valve.

10 20. A method according to claim 19 wherein said
apparatus comprises a plurality of plication bands,
with said plurality of plication bands being
sequentially deployed into the annulus of heart valve.

15 21. A method for reducing the circumference of
the annulus of a heart valve, said method comprising
the steps of:

providing apparatus for effecting a desired
geometric change in the annulus of a heart valve, said
20 apparatus comprising:

first and second plication bands, each said plication band comprising:

first and second legs each having a first end, said first ends of said first and second legs having a tissue piercing configuration; and

a bridge having first and second ends, said first end of said bridge being connected to said first leg and said second end of said bridge being connected to said second leg such that said first ends of said first and second legs are separated by a first given distance;

said bridge being configured such that when said first ends of said first and second legs have pierced tissue at said first given distance, said bridge may be deformed so as to cause said first ends of said first and second legs to move toward one another so as to thereafter be separated by a second, shorter given distance, whereby said first and second legs gather together the pierced tissue to effect a desired geometric change in the annulus of the heart valve; and

a linking construct connected to said first
and second plication bands;

deploying said first plication band in tissue;

tensioning said linkage construct;

5 deploying said second plication band in tissue;

and

releasing the tension on said linkage construct,
whereupon said linkage construct will further reduce
the circumference of the annulus of the heart valve.

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22. A method for reducing the circumference of
the annulus of a heart valve, said method comprising
the steps of:

providing apparatus for effecting a desired
15 geometric change in the annulus of a heart valve, said
apparatus comprising:

first and second plication bands, each said
plication band comprising:

first and second legs each having a
20 first end, said first ends of said first and second
legs having a tissue piercing configuration; and

a bridge having first and second ends,
said first end of said bridge being connected to said
first leg and said second end of said bridge being
connected to said second leg such that said first ends
5 of said first and second legs are separated by a first
given distance;

said bridge being configured such that
when said first ends of said first and second legs
have pierced tissue at said first given distance, said
10 bridge may be deformed so as to cause said first ends
of said first and second legs to move toward one
another so as to thereafter be separated by a second,
shorter given distance, whereby said first and second
legs gather together the pierced tissue to effect a
15 desired geometric change in the annulus of the heart
valve; and

a linking construct connected to said first
and second plication bands;

deploying said first plication band in tissue,
20 and deploying said second plication band in tissue;
and

deforming said linkage construct so as to draw
said first and second plication bands together so as
to further reduce the circumference of the annulus of
the heart valve.

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23. A method for reducing the circumference of
the annulus of a heart valve, said method comprising
the steps of:

providing apparatus for effecting a desired
10 geometric change in the annulus of a heart valve, said
apparatus comprising:

a plication band comprising:

first and second legs each having a
first end, said first ends of said first and second
15 legs having a tissue piercing configuration; and

a bridge having first and second ends,
said first end of said bridge being connected to said
first leg and said second end of said bridge being
connected to said second leg such that said first ends
20 of said first and second legs are separated by a first
given distance;

said bridge being configured such that
when said first ends of said first and second legs
have pierced tissue at said first given distance, said
bridge may be deformed so as to cause said first ends
5 of said first and second legs to move toward one
another so as to thereafter be separated by a second,
shorter given distance, whereby said first and second
legs gather together the pierced tissue to effect a
desired geometric change in the annulus of the heart
10 valve;

positioning said plication band in said left
atrium of the heart; and

deploying said plication band into said annulus
of the heart valve so as to reduce the circumference
15 of the annulus of the heart valve.

24. A method for effecting a desired geometric
change in the annulus of a heart valve, said method
comprising the steps of:

providing apparatus for effecting a desired geometric change in the annulus of a heart valve, said apparatus comprising:

a plication band comprising:

5 first and second legs each having a first end, said first ends of said first and second legs having a tissue piercing configuration; and

10 a bridge having first and second ends, said first end of said first bridge being connected to said first leg and said second end of said bridge being connected to said second leg such that said first ends of said first and second legs are separated by first given distance;

15 said bridge being configured such that when said first ends of said first and second legs have pierced tissue at said first given distance, said bridge may be deformed so as to cause said first ends of said first and second legs to move toward one another so as to thereafter be separated by a second, 20 shorter given distance, whereby said first and second legs gather together the pierced tissue to effect a

desired geometric change in the annulus of the heart valve;

positioning said plication band in a vascular structure of the heart; and

5 deploying said plication band into the side wall of the vascular structure so as to effect a desired geometric change in said annulus of the heart valve.

25. A method according to claim 24 wherein said
10 vascular structure comprises at least one of the coronary sinus and the great cardiac vein.

26. A method for effecting a desired geometric change in the annulus of a heart valve, said method
15 comprising the steps of:

providing apparatus for effecting a desired geometric change in the annulus of a heart valve, said apparatus comprising:

a plication band comprising:

first and second legs each having a first end, said first ends of said first and second legs having a tissue piercing configuration; and

a bridge having first and second ends, said first end of said bridge being connected to said first leg and said second end of said bridge being connected to said second leg such that said first ends of said first and second legs are separated by a first given distance;

said bridge being configured such that when said first ends of said first and second legs have pierced tissue at said first given distance, said bridge may be deformed so as to cause said first ends of said first and second legs to move toward one another so as to thereafter be separated by a second, shorter given distance, whereby said first and second legs gather together the pierced tissue to effect a desired geometric change in the annulus of the heart valve;

positioning said plication band against an outside surface of the heart; and

deploying said plication band into the outside surface of the heart so as to effect a desired geometric change in said annulus of the heart valve.

- 5 27. A method according to claim 26 wherein said apparatus is incorporated into a cardiac restraint device for reducing the dilatation of the heart.